

# REQUEST FOR PROPOSALS

## GEOTECHNICAL DATABASE DEVELOPMENT, PHASE 3 LTRC No. 15-1GT, SIO No. DOTLT1000048

### PROBLEM STATEMENT

Recent efforts by the Louisiana Department of Transportation and Development (DOTD) and the Louisiana Transportation Research Center (LTRC) have developed a Geotechnical Information Database, with a Geographic Information System (GIS) interface. The application connects many DOTD data sources in a single application. For the first time, roughly two-thousand boring logs are available via the DOTD Intranet and GIS server technology.

LTRC Project 03-1GT, *Development of a Geotechnical Information Database*, uploaded boring log and cone log .PDF files to DOTD's Electronic Document Management System (Content Manager). A GIS page provides the location of the documents and access. Other GIS layers include bridge scour data, average daily traffic, surface geology, quadrangle maps, and soil survey maps. ([www.ltrc.lsu.edu](http://www.ltrc.lsu.edu), Final Report #446)

LTRC Project 10-2GT, *Geotechnical Information Database – Phase 2*, established a digital database for boring log data. This project expanded utilization of the DOTD gINT database by developing specific and customized templates to import, analyze, and plot the data. This phase developed and implemented a digital system to improve and streamline the department's collection and storage methods of existing and future geotechnical data. Other Phase 2 features included a web-based system to access deep boring data, and a joint server for the Pavement & Geotechnical Design and Materials Laboratory Sections (Sections 67 & 22, respectively) for the collection, testing, reporting of results, and to provide continuity between sections. ([www.ltrc.lsu.edu](http://www.ltrc.lsu.edu), Final Report #498)

A third phase is necessary to address additional DOTD needs and expand on work developed during previous phases. Digitizing the data will require programming effort using the basic systems already in place. New modules should provide the same functionality as the existing deep borings by allowing data to be reviewed, plotted and added to the plans, via standardized templates accessible to districts and designers for analysis. The goal is to expand the functionality of the existing Geotechnical Database by incorporating the following features:

- **Subgrade Soil Survey Data:** Incorporate subgrade soil survey data into the Geotechnical Database. An interface, developed by the DOTD Pavement Management Systems (PMS) Section, for the districts to upload boring and core data (thickness, locations, etc.) is ready to deploy. Ground Penetrating Radar (GPR) and other pavement data are also in a PMS database called Deighton Total Infrastructure Management System (dTIMS). dTIMS is a data management and analysis framework that allows a user to configure an asset management system for any type of asset. The researcher may utilize these portals as a link to the Districts (simple interface), and as a way to populate the Geotechnical Database for designers (gINT/pLog users).

DCP Test Method TR645, *The Determination of In-Place Stiffness by the Dynamic Cone Penetrometer (DCP)* and analysis program is used for the collection of design information for new construction, and for the collection of data for rehabilitation projects. The data from the districts should be stored for digital access, analysis, and design. Additional templates are desired to print and analyze the data for use in design.

- **Pile/Shaft Load Test Data:** Incorporate driven pile and drilled shaft load test data to the Geotechnical Database and GIS. This data should be stored and function as an additional layer/link in the GIS to assist with future projects.

## **OBJECTIVES**

The objective of this research is to expand the development and functionality of the Geotechnical Database System to include the management of shallow boring data, DCP data, driven pile load test data, drilled shaft load test data and borrow pit data. A secondary objective is to explore and develop the ability to share information via the internet in a secure manner.

## **RESEARCH APPROACH**

The Louisiana Transportation Research Center (LTRC) is seeking the insight of proposers on how best to achieve the research objectives. Proposers shall describe research plans that can be realistically accomplished within the constraints of available funds and contract time as allowed in this RFP. Proposals must present the candidate's current thinking in sufficient detail to demonstrate their understanding of the problem and the soundness of their approach. Task descriptions are intended to provide a framework for conducting the research. The proposal shall address at a minimum, the following tasks:

### **Task 1. Records Research**

Review LTRC Research Reports from previous phases (Phase 1 and 2), and *Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS)* research/policy. Review DOTD Section 67, Section 22, PMS, LTRC, and Information Technology (IT) Sections' current data collection, testing, storage, analysis, and reporting procedures and software/applications used focusing on those regarding the collection of

1. shallow subgrade soil information (shallow borings, road cores, GPR, DCP, etc.),
2. deep boring information (boring logs, CPT files, pile/shaft, driving records, test pile information, and load test information, etc.
3. borrow pit information

The researcher will work/meet with the Project Review Committee (PRC) to ensure previous and existing efforts, investments of thought, policy, and resources from the previous phases and existing applications will benefit the researcher's efforts and result for the Department. The researcher is strongly encouraged to develop/link to existing sources (as possible) to access data without replication or duplication.

### **Task 2. Interim Report**

Based on the results of Tasks 1:

- Develop a detailed work plan outlining tasks and recommended approach to accomplish objectives.
- Prepare an interim report outlining the structure, steps, itemized costs and philosophy in the work plan to streamline the data recording and storage, transfer, tracking, and reporting processes.

### **Task 3. Database Development – Shallow Subgrade Information**

Upon approval of work plan, develop and implement a system to collect, import, store/link, digitally manage, and plot shallow subgrade information and associated data.

### **Task 4. Application Expansion**

Pile and Shaft data. Add pile/shaft load test data, test pile information, pile-driving records, and other deep boring information to the Geotechnical Database so they are digitally and easily accessible via the database and GIS systems.

Borrow Pit Information. Borrow pit sites' locations should be added to the GIS database with material types and dates linked for reference.

Public Portal for Boring Logs. Security issues within IT (content manager, etc.) have prevented public access to geotechnical boring information via the external Internet due to content manager restrictions. Utilizing the gINT/pLog database, explore and develop the ability to share information via the internet in a secure manner.

### **Task 5. Demonstrate the Project.**

The researcher shall provide live demonstrations throughout the progress of the project and be tied to project milestones. A prototype demonstration shall be provided at twelve (12) months. The demonstrations are intended to show the capability, connections, etc. to the users and stakeholders who may help direct efforts on the project. The deliverables shall be complete after eighteen (18) months and be accompanied by a final demonstration to the Project Review Committee.

### **Task 6. Provide Training and Implementation Support.**

The researcher shall provide training to applicable users and provide implementation support for six (6) months after project demo/delivery. Support (time & funds) will start after acceptance of the PRC, and is designed to address initial-use hurdles and remedy any technical “bugs” which may arise during initial implementation. Training scope should be defined and funds should be documented as a separate budget item in the proposal. Provide maintenance and support contacts’ information; and agreement and cost information for continuing support.

### **Task 7. Provide a Final Report**

The researcher shall provide a final report that documents the entire research effort, and make a summary presentation to the Project Review Committee (PRC) upon completion of the work. The report shall direct and recommend future steps toward the incorporation of the research into department policy. Document the research efforts for internal future reference and the benefit of others. Include recommendations on other areas that could be further expanded in subsequent research projects. A final draft report is due three (3) months prior to the project completion date for review and approval.

The report must document the procedures for maintaining the application and supporting databases. Flow charts should clearly identify the flow of data, as well as the individuals responsible for each step of the process. In addition, the report must identify who will be responsible for future technical support and training of users.

## **DELIVERABLES**

The proposal shall include project deliverables for appropriate tasks. Deliverables shall be due as defined in the proposal. The proposal shall include at a minimum the following deliverables:

- Interim Report and Presentation to the PRC (Task 2)
- Shallow Subgrade Database (Task 3)
- Database Expansion Items (Task 4)
- Demonstration (Task 5)
- Training and Implementation Support (Task 6)
- Final Report (Task 7)

## **SPECIAL NOTES**

- A. LTRC research projects will be conducted in accordance with the LTRC Manual of Research Procedures, 2003 edition. ([http://www.ltrc.lsu.edu/pdf/research\\_man03.pdf](http://www.ltrc.lsu.edu/pdf/research_man03.pdf))
- B. Any work that is anticipated to be required from LTRC or DOTD forces shall be specifically detailed in the proposal.
- C. LTRC projects are intended to produce results that will be applied in practice. It is expected that the implementation of the results of this research into practice will evolve as a concerted effort during this project. The final report must contain an implementation plan to include, as a minimum, the following:
  - a. The “product” expected from the research;
  - b. A realistic assessment of impediments to successful implementation;
  - c. The activities necessary for successful implementation; and
  - d. The criteria for judging the progress and consequences of implementation.
- D. To assist in the implementation process, the investigators of this research shall present the final results to LA DOTD officials in an oral presentation to be held in Baton Rouge, Louisiana at LA

DOTD Headquarters after acceptance of the final report.

- E. The proposal should include travel to meet with the Project Review Committee for a “kick off” meeting, presentation of interim report, and presentation of the final report at a minimum. Funds budgeted for travel shall be limited to what is necessary for the conduct of the research. Funds shall not be budgeted for conference travel. Funding for technology transfer of research results are available upon request subject to LTRC approval and available funds.
- F. LTRC’s mission includes the support of higher education in Louisiana. Consultant and out-of-state institutions submitting proposals are encouraged to cooperate and collaborate with Louisiana universities for the purpose of sharing of knowledge and increasing transportation expertise in the academic community.
- G. Graduate assistance stipends are allowed. Tuition reimbursement or tuition remission rates applied to stipends are not allowed.
- H. To equitably answer any questions regarding this Request for Proposals, the Louisiana Department of Transportation and Development (DOTD) website will be updated with questions and answers and related documents regarding the project.  
<http://webmail.dotd.louisiana.gov/agrestat.nsf/WebAdvertisements?OpenPage>  
LA DOTD makes these documents available for informational purposes only to aid in the efficient dissemination of information to interested parties. LA DOTD does not warrant the documents against deficiencies of any kind. The data contained within this web site will be periodically updated. Interested parties are responsible to be aware of any updates. Questions regarding this RFP should be submitted in writing to the LTRC contact person. Questions must be received by close of business seven calendar days prior to deadline date.
- I. Consultants and business entities shall be registered with the Secretary of State in order to be able to work in Louisiana prior to award of contract. <http://www.sos.la.gov/tabid/1011/Default.aspx>
- J. If Sub-Consultants/Entities are used, the Prime Consultant/Entity must perform a minimum of 51% of the work for the overall project.
- K. LTRC reserves the right to withhold invoice payments for delinquent deliverables as defined in the proposal.
- L. The researcher(s) should have enough geotechnical experience to read and interpret boring logs and soil data, and have demonstrated experience in software and web application development, as well as computer systems used to analyze and interpret geotechnical data.
- M. The department will assist researcher(s) with acquiring temporary USER ID for the DOTD domain, Content Manager, and other security access.
- N. The Geotechnical Design section will provide a workspace and computer terminal to the researcher to upload the data as necessary.
- O. Ensure simplicity and interoperability with DOTD databases by working with the applicable Sections. The researcher should detail any necessary hardware or software recommendations. The researcher must adhere to the attached DOTD Web Application Development Standards and DOTD GIS Application Development Standards.

#### **ESTIMATED COST**

\$200,000.00

#### **ESTIMATED COMPLETION TIME**

24 Months (*includes 3 months for review and approval of final report - i.e. draft final report due in 21months*)

#### **LTRC PRIMARY CONTACT**

Gavin P. Gautreau, P.E.  
LTRC, Senior Geotechnical Research Engineer  
Gavin.Gautreau@LA.GOV  
225-767-9110

#### **AUTHORIZATION TO BEGIN WORK:**

March 2015 (estimated)

## **PROPOSAL FORMAT**

All proposals are require formatting according to the LTRC Manual of Research Procedures available on the web site: [www.ltrc.lsu.edu](http://www.ltrc.lsu.edu). Chapter 2 of that manual provides guidance on proposal development.

## **PROPOSAL SELECTION**

The Project Review Committee selected for this project will review, evaluate, and rank all proposals received using the criteria established on the attached proposal review form.

## **DEADLINE FOR RECEIPT OF PROPOSALS**

Ten copies of the proposal must be received by LTRC by the close of business **January 30, 2015**. Proposals should be submitted to:

Harold R. Paul, Director  
Louisiana Transportation Research Center  
4101 Gourrier Avenue  
Baton Rouge, LA 70808

## **ACRONYMS, ABBREVIATIONS, & SYMBOLS**

CD	Compact Disc
CM	Content Manager (DOTD Enterprise Document Management System - Archives)
dTIMS	Deighton Total Infrastructure Management System
DVD	Digital Video Disc
ERP	Enterprise Resource Planning (ERP) one business system for Louisiana
Falcon	Enterprise Document Manager, DOTD's Electronic Plans Distribution Center
gINT	Geotechnical Integrator (Commercial Software), a Bentley Software Product
GIS	Geographic Information System
GPS	Global Positioning System
HQ	Headquarters
IT	Information Technology
DIGGS	Data Interchange for Geotechnical and Geoenvironmental Specialists
DOTD	Louisiana Department of Transportation and Development
LSU	Louisiana State University
LETS	DOTD Projects about to be let out for bid.
LTRC	Louisiana Transportation Research Center
MaTT	Materials and Testing Tables Database System
PRC	Project Review Committee
Project Wise	DOTD internal file sharing, a Bentley Software Product
Sharepoint	DOTD internal file sharing, searchable and discoverable (tracks changes)
SSS	Subgrade Soil Survey
STRM	Structures Master (Internal DOTD Database)
TOPS	Tracking of Project Systems (Internal DOTD Database)
SMM & LIMS	Site/Materials Manager & Laboratory Information Management System
VPN	Virtual Private Network

# DOTD Web Application Development Standards

## Purpose:

The DOTD IT Section has implemented standards for all web applications. Any web application developed for DOTD must comply with these software standards. By meeting these standards, contractors and developers will ensure that their work will be compatible with the existing DOTD IT infrastructure. Contract deliverables that do not comply with these standards cannot be assimilated into the DOTD IT system. In addition, applicable State of Louisiana, Office of Information Technology standards also apply.

This document is intended as a high-level overview and is not inclusive of all web application standards. The La DOTD's Web Standards and Best Practices documents will be provided on an as-needed basis.

## Development Environment Standards for DOTD Web Applications:

**Web Server OS:** Microsoft Windows Server 2008 with IIS7. All web application must be compatible with this OS.

**Development IDE:** Microsoft Visual Studio 2008 SP1. Applications must be delivered in the form of a Visual Studio, non-compiled solution including licensed copies of all dependent libraries and becomes the property of DOTD.

**Approval and Registration of 3rd Party Components:** All third party libraries must be approved and registered in the name of DOTD.

## Software Standards for DOTD Web Applications:

All web applications must be built with **ASP.NET** and the **.NET 3.5 SP1** Framework (or newer) using the **Visual Basic.NET** programming language. ASP.NET MVC is not an approved framework.

The AJAX Control Toolkit Library may be included in any web application.

All Intranet web applications must be viewable and fully functional in **Internet Explorer 7** and above. All public web applications must be viewable and fully functional in all major web browsers.

## Database Standards for DOTD Applications:

DOTD web applications must use **DB2** as the standard database management system. Approval to use **Microsoft SQL Server** will be given on an individual basis.

## Documentation:

Specific documents will be identified in the contract.

- User Guide must be available online from within the application
- All design documents, installation instructions, and implementation guides must be delivered with the application

## Development:

DOTD will provide the Master Pages and Style Sheets for web applications.

DOTD Standards must be followed in all web applications. The standards documents will be made available on a need to know basis. Applications developed on site must follow the DOTD software development life cycle and other DOTD processes.

Applications developed offsite must follow these guidelines:

- The Contractor will provide a scope of work to IT at the beginning of the project.
- The Contractor will involve the applications clients in all requirements gathering sessions.
- The Contractor will adhere to La DOTD's Web Standards and Best Practices.
- The Contractor will deliver all source code at least once a month to LA DOTD. La DOTD will then perform code reviews to validate web standards and best practices are being followed.
- The Contractor will perform adequate testing before the solution is transitioned to La DOTD. This includes but is not limited to unit tests, functional tests, integration tests, performance tests, and user acceptance tests. La DOTD IT personnel must be involved in all testing.
- For solutions that will be hosted by La DOTD, the solution must be deployed to the La DOTD staging environment where tests will be executed against La DOTD test data. The Contractor must provide documentation of the steps required to deploy the solution. The La DOTD project manager will be responsible for the deployment.
- The Contractor will be responsible for fixing all defects prior to transitioning the project to La DOTD.

# DOTD GIS Application Development Standards

## Purpose:

The DOTD IT GIS Unit has implemented standards for all applications using GIS. Any GIS application developed for DOTD must comply with these software standards. By meeting these standards, contractors and developers will ensure that their work will be compatible with the existing DOTD IT infrastructure. Contract deliverables that do not comply with these standards cannot be assimilated into the DOTD IT system. In addition, applicable DOTD IT and State of Louisiana, Office of Information Technology standards also apply.

All software must be developed and delivered using the current version of production software at DOTD.  
All applications developed and hosted off-site must adhere to this requirement, before they can be migrated to the DOTD system.

## Development Environment Standards for DOTD GIS Applications:

1. Microsoft Windows Server 2003 with IIS 6 is the web hosting standard for DOTD GIS.
2. Microsoft Visual Studio 2008 SP1 is the development environment standard for DOTD GIS.
3. Microsoft Silverlight 3 is the current version for development environment standard for DOTD GIS.
4. ESRI ArcGIS 9.3.1 SP1 is the GIS software standard for DOTD GIS.
5. Applications must be written in [VisualBasic.NET](#), implementing code-behind pages for User Interface (UI) content.
6. All code modules need option strict and option explicit enabled.
7. Applications must be delivered in the form of a Visual Studio, non-compiled solution including licensed copies of all dependent libraries and becomes the property of DOTD.

## Software Standards for DOTD GIS Web Applications:

1. Applications must use the ArcGIS API for Microsoft Silverlight/WPF to implement GIS User Interface (UI) components.
2. Applications must be developed for ArcGIS server 9.3.1 SP1 for the .NET Framework running on IIS 6.

## Software Standards for DOTD GIS Non-Web Applications:

1. Any ArcGIS Desktop extensions or stand alone applications must use ArcObjects and ArcEngine version 9.3.1 SP1 where GIS functionality is needed.

## DataBase Standards for DOTD GIS Applications:

1. The DOTD IT GIS Unit uses IBM DB2 and Microsoft SQL Server as its database standards.

DOTD will provide style sheets, GIS data, and other information upon request.